

# *Postings: from the desk of Jim Brodrick*

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Last week's *Posting* on standards generated a good deal of reader response from those seeking clarification on various issues, and rightfully so: solid-state lighting is a complex technology with an entire spectrum of technological issues to address, and no single Posting could attempt to cover them all. This week, I will try to clarify some of the questions that I received.

But before I address standards, I receive a lot of questions like the following:

***Why did you set the ENERGY STAR luminaire efficacy requirement for [fill in the blank] to its current level?***

As I have emphasized before, setting ENERGY STAR qualification criteria for solid-state lighting was not part of my bailiwick. It was handled in a different DOE office. That being said, the basic precepts and tenets of the ENERGY STAR criteria emerged from the work that my program sponsored in cooperation with the SSL industry. It is my understanding that efficacy levels were set equivalent to whole luminaire CFL performance. For fixture types in which CFLs were not the incumbent energy efficient light source technology, efficacy levels were set at high performance, whole luminaire linear fluorescent or HID performance. Additional requirements were added to assure high levels of product quality to minimize the likelihood of buyer dissatisfaction with SSL. In addition, the qualifying levels firmly espoused luminaire efficacy and three basic standards and test procedures that were a product of nationally-recognized consensus review -- *IES LM-79-2008*, *IES LM-80-2008*, and *ANSI C78.377-2008*.

As I'm sure you are aware, the entire ENERGY STAR Program is undergoing a transition resulting in the Environmental Protection Agency assuming the criteria setting process for all products, including solid-state lighting. It is my understanding that the EPA will soon be initiating a public review process in which it will be proposing amendments to the SSL luminaire program. While I am not privy to any of EPA's thinking regarding possible changes, I do understand that they held a small stakeholder meeting last week to gauge opinion on possible program scenario changes. It is DOE's understanding that EPA will proceed with a public review and comment process once an internal decision is made on how to proceed with programmatic changes. The normal ENERGY STAR process is to allow time enough for stakeholders to digest the proposed changes and provide substantive comments.

If you have questions prior to the release of proposed changes, you might want to use the following avenue as a contact point:

[ssl@energystar.gov](mailto:ssl@energystar.gov).

Now some questions on standards:

***Last week's Posting says that the IES is working on TM-21, which is a method for extrapolating the lifetime of LED luminaires. I thought that TM-21 only applied to lifetime extrapolation for LED chips based on LM-80. So, which is it – chip lifetime or luminaire lifetime?***

Good catch and you are correct. TM-21, when completed, is intended to provide a method for estimating lumen depreciation of LED packages and modules. These estimates, along with other information on LED reliability, can then be used to help assess the expected useful life of a complete luminaire.

***What's the status of the FTE (Fitted Target Efficacy) metric for***

***outdoor lighting?***

After more than two years of drafts, public comment periods, and technical revisions, DOE was prepared to establish final outdoor lighting criteria in late 2009, based partly on a new metric that DOE developed to characterize the energy efficiency of outdoor lighting. This new metric is called Fitted Target Efficacy (FTE). The National Electrical Manufacturers Association (NEMA) asked DOE to delay issuance of those criteria until it could develop a similar metric as a possible substitute for FTE. DOE agreed to work with NEMA to see if a superior metric could be developed, but at this point, it's not clear when the work will be complete. We'll let you know when we have something substantive to report on the new proposed metric.

***I've heard that the roadway lighting standard RP-8 does not account for the uniformity of SSL products - are there any plans to update the standard so that it does?***

ANSI/IESNA RP-8-00 (recommended practice for roadway lighting) provides recommended limits for average:minimum uniformity ratios, but neither encourages nor discourages further improvements in uniformity, i.e., it does not indicate ideal "target" ratios. RP-20, a similar standard, does the same for parking lots and structures, but uses max:min instead of avg:min. DOE is not aware of any plans to update the uniformity recommendations in RP-8.

The Lighting Research Center's Luminaire System Application Efficacy considers both illuminance and uniformity, as required for a given installation, to characterize the shape and span of each luminaire's distribution relative to type-specific targets established as part of the metric's definition. The NEMA Target Efficacy Rating does not consider uniformity. DOE's draft Fitted Target Efficacy uses 6:1 avg:min, the minimum uniformity ratio recommended by IES, to characterize the shape and span of each luminaire's distribution.

***I was both intrigued and a bit confused by what you said in last***

***week's Posting about the new Color Quality Scale. Can you elaborate?***

The Color Quality Scale (CQS) is intended to replace or supplement the current Color Rendering Index (CRI), which is known to have a number of technical shortcomings, especially with regard to rendering of saturated colors. Some light sources, including some SSL products, can receive low or modest CRI scores yet be perceived by their users as having high light quality. The developers of the new CQS believe it will better capture what most humans perceive as superior color rendering.

***I've heard that after a certain amount of operating time, lenses and optics will ultimately be the components that doom an LED product. Are there any standards being developed to address their degradation?***

I am not aware of a published industry standard that specifically addresses the degradation of LED lenses and optics. Optical degradation is tricky to measure, since the optics may be made of different types of glass or plastic, may or may not incorporate phosphors or other materials that alter the characteristics of the light passing through them, and may or may not be integrated into the light source. Each type of optical material reacts in a different way to the various degradation accelerants (such as heat, moisture, and UV radiation) that a luminaire may be subjected to in its operating environment, so there are likely many different test methods that could be used to measure such degradation. As with any component of a luminaire, if you have concerns about the longevity of the optical elements of a luminaire, the best thing you can do is to ask for more information from the manufacturer – inquiring about the materials that an optic is made from may be useful in determining what accelerants could cause its degradation.

That being said, this is a good question that gets back to the issue of overall luminaire reliability and lifetime, which depends on the performance of each and every luminaire component, from the LED

package that emits the light, to the optics that direct and tune the emitted light into usable illumination, to the seemingly trivial electrical connector that plugs into the wall outlet. A DOE-industry working group is working hard on the issue of reliability as we speak, and they expect to release guidelines in the coming months.

***Manufacturer XYZ is trying to sell me these [downlights, replacement lamps, etc.] and they look good, but what technical information should I ask for before I make my decision?***

This question gets to the heart of why we're pursuing LED standards in the first place, which is to develop a common language to define LED performance so that those making the buying decisions will have a consistent set of performance values to base their decisions off of. As I mentioned earlier, LM-79 and LM-80 are the cornerstones of the LED standards work that has been completed so far, and anyone who is considering purchasing an LED product should, at the very least, demand to see test data that was collected according to those standards. While standards development is slow and painstaking work, every new standard that is finalized is another tool that we can all use to identify high-quality products and help to encourage the market adoption of solid-state lighting.

As always, if you have questions or comments, you can reach me at [postings@lightingfacts.com](mailto:postings@lightingfacts.com).

*James R. Brodrick*

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